JRMC Journal of Regional Medical Campuses

Alleviating the Physician Shortage by Increasing Medical Student and Resident Physician Capacity in the North Midwest (Iowa, Minnesota, North Dakota, South Dakota, Wisconsin)

Nicholas Leifeld; George Ongoro; Patrick Bright, MA; Peter Nalin, M.D., MBA, CPE, FAAFP

DOI: https://doi.org/10.24926/jrmc.v7i4.6102
Journal of Regional Medical Campuses, Vol. 7, Issue 4 (2024)

Published by University of Minnesota Libraries Publishing

LIBRARIES PUBLISHING

Alleviating the Physician Shortage by Increasing Medical Student and Resident Physician Capacity in the North Midwest (Iowa, Minnesota, North Dakota, South Dakota, Wisconsin)

Nicholas Leifeld; George Ongoro; Patrick Bright, MA; Peter Nalin, M.D., MBA, CPE, FAAFP

Abstract

The authors' central goal was to design a plan for the anticipated physician deficit in the North Midwest region of the United States. We analyzed the Association of American Medical Colleges' (AAMC) 2024 projections, which have forewarned of a significant shortage by 2036. This study addresses this challenge by proposing targeted plans to augment medical student and resident capacity in Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin. The purpose was to develop plans for each state to ensure an adequate supply of physicians to meet the growing demands on the healthcare systems. The calculations identified the approximate balance between the growing healthcare needs of the North Midwest region and the capacity of the existing medical education and residency training programs. We suggested the incremental expansion of medical student seats and residency positions over the next 10 years. We outlined how to bridge the physician gap while avoiding any undue stress on the existing systems.

The application of these strategies could establish a robust physician workforce that meets the healthcare demands of each North Midwest state. Ultimately, the overarching goal was to provide a baseline approximation to aid in estimating the current need for the expansion of medical educational systems.

Keywords: Physician Shortage; Medical Education Expansion; Healthcare workforce planning

Introduction

Considering the ongoing healthcare workforce crisis that threatens the health of our nation, we must turn our attention to the critical issue of the physician shortage in the United States. A robust healthcare ecosystem depends on an adequate supply of skilled healthcare professionals. However, as we stand on the cusp of a new era in healthcare delivery, the current supply is inadequate, and the forecasts are alarming.

The Association of American Medical Colleges (AAMC) sounded the alarm in their 2023 study (published in 2024) forecasting a dire scenario by 2036. Their findings projected a shortage ranging from 13,500 to 86,000 physicians across the nation.[1] This deficit will disproportionately impact underserved regions, exacerbate health disparities, and compromise access to care. The report, "*Complexities of Physician Supply and Demand: Projections From 2021 to 2036,"* considered various factors contributing to the physician shortage including population growth, aging demographics, and evolving healthcare delivery models. In this article we will examine the current

Nicholas Leifeld; N. Leifeld is a third-year medical student at the University of Minnesota Medical School - Duluth Campus.
George Ongoro; G. Ongoro is a third-year medical student at the University of Minnesota Medical School - Duluth Campus.
Patrick Bright, MA; P. Bright is a researcher in the Department of Family Medicine and Biobehavioral Health and of the Memory Keepers Medical Discovery Team at the University of Minnesota Medical School - Duluth Campus.
Peter Nalin, M.D., MBA, CPE, FAAFP; Dr. Peter Nalin is Professor and Department Head of Family Medicine and Biobehavioral Health at the University of Minnesota Medical School.
Corresponding author: Nicholas Leifeld, University of Minnesota - Duluth Campus, 1035 University Drive, Duluth, MN 55812; Telephone: 218-330-8249; E-mail: leife050@umn.edu. If Nicholas Leifeld can't be reached, Dr. Peter Nalin can be contacted by telephone: 317-908-9562 or by email: pnalin@d.umn.edu

capacity of medical education in the North Midwest, describing both the challenges and opportunities. While this impending physician shortage is a national concern, our focus turns to the North Midwest—a region emblematic of the broader challenges faced by rural and underserved areas. The North Midwest, comprising the states of Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin, is not immune to this crisis. This region exemplifies the stark realities of the physician shortage, where vast expanses of rural communities are struggling to access even basic healthcare services.[2,3]

The purpose of this research article is to explore solutions to address this growing physician shortage in the North Midwest. Specifically, we propose that expanding medical student and resident capacity in this region can serve as a promising solution. By fostering the education and training of future physicians within these underserved communities, we aim to create a sustainable pipeline of healthcare professionals who are well-prepared and deeply connected to the unique healthcare needs of this region.

This article will delve into the factors contributing to the physician shortage, including population growth, aging demographics, and evolving healthcare delivery models. Additionally, we will examine the current state of medical education in the North Midwest, highlighting the existing challenges and opportunities. Moreover, using a review of successful initiatives and case studies from other regions, we will draw inspiration for potential strategies to implement in the North Midwest.

Methods

AAMC Report and Its Considerations

The AAMC study considered many factors and scenarios to come up with its lower (13,500) and upper (86,000) shortage numbers. Each scenario calculated and took into account the following: the current rate of physicians entering the workforce; the current rate of physicians leaving the workforce; the current utilization of healthcare services by the population; healthcare services provided by physicians along with average weekly hours worked; population growth; aging populations requiring more utilization of services; and shifting demographics. The current rate of physicians entering and leaving the workforce was calculated using the American Medical Association's (AMA) Physician Professional Data using active physicians who have completed their graduate medical education. The shortage is further defined by using a full-time equivalent (FTE) on a specialty-by-specialty basis.

COVID-19 and its impacts have yet to be fully understood. While the report is comprehensive, it does make note of COVID-19 and its ill-understood effects on healthcare disparities and the current physician shortage. The report recommends further research into the area and cautions readers of the uncertain impacts of the COVID pandemic upon healthcare systems.

Calculation of Minimum and Maximum Physician Shortages

To quantify the extent of the physician shortage within individual states in the North Midwest region, we employed a data-driven approach. Our methodology is rooted in the 2023 study conducted by the Association of American Medical Colleges (AAMC), which projected an increasing nationwide physician shortage by the year 2036. This study estimated a total growth of the current shortage of up to 86,000 physicians in the United States.[1]
We adopted a proportional approach based on state populations relative to the national population to allocate this national shortage among states within the North Midwest region. This ratio was used to determine the approximate physician shortage projection on a state-by-state basis using simple demographic information.

National Physician Shortage Allocation:

We determined the proportion of the national physician shortage projections that correspond to the North Midwest region. We used the 2024 AAMC projections as a baseline. The 2024 report used a 12-year projection timeline. We then divided the state-adjusted shortages by 12 to approximate the yearly growth in physician workforce shortages. This calculation carries some limitations which are further

explored in the discussion section yet should suffice to serve as a linear approximation.

State and National Population Data:

We obtained state-specific and national population data from the U.S. Census Bureau [4] to determine each state's population within the North Midwest region.

Calculation of Minimum and Maximum Shortages:

Using the population data and the national shortage allocation, we calculated both the minimum and maximum physician shortage projections for each state in the North Midwest. The minimum shortage was calculated by applying the lower limit of the AAMC's projected shortage (13,500), while the maximum shortage was determined by applying the upper limit (86,000).

Development of 5-Year and 10-Year Plans

Having established the minimum and maximum physician shortages for each state in the North Midwest, we proceeded to formulate a plan for addressing these deficiencies. The 2024 AAMC report used physician retirement rates, a growing aging population, and medical school graduation rates. Our objective was to develop plans that would gradually increase medical student and resident capacity in the region, thus mitigating the projected shortages.

Our 5-Year and 10-Year Seat Allocations: Based on the insights gained from the steps above, we developed two distinct plans: a 5-year accelerated and a 10-year plan. These plans outline the incremental addition of medical student and resident seats in each state within the North Midwest region, with a focus on aligning growth with projected increases in current shortages.

Our methodologies for calculating state-specific shortages and developing 5-year and 10-year plans are based on a data-driven and consultative approach, tailored to the needs of each state within the North Midwest region. These plans serve as a foundation for addressing the physician shortage and improving healthcare access in the region while respecting the challenges healthcare education faces today. Our methodologies can be similarly applied to other states.

Results

In this section, we present the results of our analysis, detailing the current medical student seat capacities and residency positions for each state within the North Midwest region. We also outline our 5-year accelerated and 10-year plans to address physician shortages in these states. We included a table with all our estimates. Predicted shortages by 2036, estimated shortage growth per year per state, 10-year plan seats needed per year, and 5-year accelerated plan seats per year are all expressed as a range from the minimum number to the maximum number based on the lower and upper limits of the shortage predictions, respectively.

The current physician shortage is taken from the Bureau of Health Workforce, Health Resources and Services Administration (HRSA), and the U.S. Department of Health & Human Services. These are represented as the number of physicians needed to remove the Healthcare Physician Shortage Areas (HPSA) designation per state.[5] It should be noted that this would entail the exact number of physicians needed in these mostly rural areas to have the desired impact of removing the designation.

State	Current Population	Current Physician Shortage	Total Medical Student Seats	Total Residency Slots	Predicted Shortages by 2036 (min-max)	Estimated Shortage Growth per Year (min-max)	10-Year Plan (Seats Needed to Add per Year min-max)	5-Year Accelerated Plan (Seats Needed to Add per Year min-max)
Iowa	3,200,517	157	152	249	130 - 826	11 - 69	3 - 7	3 - 14
Minnesota	5,717,184	192	344	481	232 - 1476	19 - 122	2 - 13	4 - 25
North Dakota	779,261	39	71	62	32 - 201	3 - 17	1 - 2	1 - 4
South Dakota	909,824	45	71	52	37 - 234	3 - 19	1 - 2	1 - 4
Wisconsin	5,892,539	134	438	486	239 - 1531	20 - 127	2 - 13	4 - 26

Table 1: A table representing each of the five states current populations, current physician shortages, total medical student seats, total residency slots, predicted shortages by 2036, estimated shortage growth per year, 10-year plan of seats needed to add per year, and 5-year accelerated plan.

These plans represent a baseline approach to addressing the growing physician shortage in the North Midwest region. Through collaboration,

innovation, and strategic investments in medical education and training, we aim to ensure that every community in the region has access to high-quality healthcare services, thus safeguarding the health and well-being of each state's constituents.

Discussion

The results of our analysis underscore the pressing need for a measured approach to address the growing physician shortage in the North Midwest region. Our analysis reveals that every state within the region is grappling with a significant projected physician shortage by the year 2036, while revealing differences among the states in terms of magnitude. To effectively address this challenge, our findings strongly support a consistent, incremental expansion of medical student seats and residency positions in each state. By incrementally increasing medical student seats and residency positions, we can ensure that growth aligns with projected shortages, thereby avoiding undue strain on resources and healthcare institutions.

Furthermore, this steady expansion approach recognizes the time required to establish and maintain high-quality medical education programs. It acknowledges that building a sustainable pipeline of healthcare professionals is not a quick fix but rather requires a long-term commitment. This approach also mitigates the risk of oversaturating the job market with newly trained physicians, a scenario that could lead to underemployment and workforce imbalances.

Another large issue with the current physician shortage is maldistribution. The physician shortage issue is more complex and nuanced than a state-by-state population-based approach. One of the largest contributors to the problem is the maldistribution of physicians. Currently, the people most impacted by the shortage are those in rural designated areas, the areas of most difficulty to recruit physicians successfully. This further compounds the problem. While we know this piece of the puzzle requires a much more intricate plan, and perhaps an area of further study, we accept that addressing the maldistribution in all five states is too granular for this methodology and its objectives.

In conclusion, our research emphasizes the imperative of a balanced and gradual expansion of medical education and training capacity in the North Midwest states. By aligning growth with projected shortages, we can work toward bridging the physician workforce gaps sustainably and equitably. This approach acknowledges its limitations due to the multifaceted challenge of the physician shortage and lays the foundation for a baseline response to the incipient physician shortage.

Alternative Strategies to Address the Physician Shortage

While our study focuses on expanding medical education and training programs, it is essential to recognize that addressing the physician shortage requires multiple, diverse strategies. Here are alternative methods that can complement these efforts.

Loan Forgiveness Programs:

Loan forgiveness programs have gained prominence as a viable strategy to attract healthcare professionals to underserved areas and reduce the financial burden associated with medical education. These programs offer incentives to physicians, including recent medical graduates, to practice in communities with limited access to healthcare services. By alleviating the burden of student loan debt, these programs encourage healthcare professionals to pursue careers in areas where their expertise is critically needed.

One key advantage of loan forgiveness programs is the mitigation of financial barriers that deter medical graduates from pursuing primary care careers and practicing in underserved regions. High levels of student debt often led graduates to opt for more lucrative specialties and urban practice settings. Research has shown that medical students who anticipate significant debt are less likely to choose primary care specialties, which are essential for addressing healthcare disparities in underserved areas.[6,7]

Loan forgiveness programs can play a pivotal role in reversing this trend. By offering financial incentives,

such as repayment of educational loans, stipends, or scholarships, these programs make primary care careers and rural practice settings more attractive. A study by Friedman et al., (2016) demonstrated that loan forgiveness programs were associated with an increased likelihood of physicians choosing primary care specialties and practicing in underserved areas.[7] This shift in workforce distribution can contribute significantly to reducing physician shortages in such regions.

Additionally, loan forgiveness programs can be designed to target specific healthcare needs within underserved communities. For example, programs may prioritize psychiatrists in regions with mental health disparities or family physicians in rural areas lacking primary care access. Tailoring these programs to local needs enhances their effectiveness and ensures that the physician workforce aligns with the unique challenges faced by underserved populations.[8]

Currently, loan forgiveness tools are utilized in every state in some way, shape, or form, and to great effect. In Minnesota, the Health Professional Loan Forgiveness Program has been around for more than three decades and has been utilized by over 1000 physicians with promising impact. An evaluation by the Minnesota Department of Health concluded that this program leads to a far greater percentage of physicians practicing in rural communities throughout their careers.[9] This is even after their legal obligations to the loan forgiveness program have been met.

To summarize, loan forgiveness programs offer a powerful adjunct to address the physician shortage by attracting healthcare professionals to underserved areas and incentivizing careers in primary care. By alleviating the financial burden of medical education, these programs can help meet immediate healthcare needs and contribute to a more equitable distribution of physicians across various specialties and geographic regions.

Interprofessional Collaboration:

Interprofessional education (IPE) and collaboration are essential components to address physician shortages effectively. This approach brings together various healthcare professionals, including physicians, nurses, nurse practitioners, physician assistants, pharmacists, and allied health providers, to collaborate seamlessly, enhance patient care, and maximize workforce efficiency.

Numerous studies have demonstrated that IPE not only improves healthcare teamwork but also results in better patient outcomes and more efficient healthcare systems.[14] By promoting collaboration among healthcare professionals, IPE can help address physician shortages by enabling non-physician healthcare professionals to work more effectively within their designated roles, enhancing the overall quality of care.

Furthermore, IPE fosters a culture of mutual respect and understanding among healthcare providers, connecting traditional silos and facilitating a more holistic approach to patient care. This collaborative ethos can be leveraged to attract and retain healthcare professionals in underserved regions. Studies have shown that working in collaborative environments is a significant factor influencing healthcare professionals' decisions to practice in rural and underserved areas.[11]

By harnessing the full potential of healthcare teams and empowering healthcare providers to work collaboratively within their designated roles, IPE can enhance the delivery of care in underserved areas, improve patient outcomes, and create a more sustainable and equitable healthcare workforce.

Workforce Retention Programs and Professional Development Opportunities:

Implementing workforce retention programs and emphasizing ongoing professional development opportunities can aid in retaining physicians in underserved areas.[15] Retention initiatives, such as mentorship programs, continuing medical education support, and career advancement opportunities, can enhance job satisfaction and encourage physicians to remain in communities facing shortages. Additionally, offering incentives for long-term commitments, creating a supportive work environment, and addressing professional burnout can all contribute to

retaining healthcare professionals in underserved regions.

Limitations of the Study

While our study offers valuable insights into addressing the physician shortage in the North Midwest region, it is essential to acknowledge several limitations.

Data Sources and Projections: Our calculations rely on the AAMC's 2024 projections for the year 2036. These projections are based on various assumptions, including healthcare policy changes, practice patterns, and population dynamics. Future changes in these factors may impact the accuracy of our projections.

Population Growth and Demographic Shifts: Our analysis assumes that population growth and demographic shifts will remain consistent with historical trends. However, unforeseen changes in population dynamics, such as migration patterns, birth rates, new diseases, and death rates could influence the extent of the physician shortage.

Evolving Healthcare Models: Healthcare delivery is evolving, with the expansion of telemedicine, as well as growing numbers of nurse practitioners and physician assistants performing increasingly significant roles in healthcare provision. Future studies should consider how these changes may impact the physician shortage landscape.

Economic Factors: Our plans for expanding medical education and training programs do not account for potential economic challenges, including fluctuations in funding for medical schools and the financing of residency programs.

Assumption of Linear Growth: Our 5-year and 10-year plans assume a linear growth in physician shortage numbers. In reality, growth is influenced by various factors, including regulatory approvals, resource availability, and a myriad of other factors. An exponential model of physician shortage growth is beyond the scope of this article. Our assumption of linear growth serves as a practical approximation useful to universities, governments, and policymakers for decision-making.

Summary

In summary, utilizing the 2023 AAMC study as a foundation, the physician shortage is growing in the North Midwest region. Our central objective has been to formulate plans that incrementally increase the number of medical student seats and increase the number of residency positions in each respective state. This approach is calibrated to align with the demands of the North Midwest and to avoid overburdening existing healthcare infrastructures.

Our findings underscore the critical need for a measured response to the projected physician deficit, emphasizing the importance of planning to bridge the gap. By balancing the growing healthcare needs of the North Midwest with the capabilities of medical education programs, our proposed outline seeks to ensure the sustainability of the healthcare workforce.

Moreover, we underscore the crucial roles of interprofessional education, loan forgiveness programs, workforce retention initiatives, and support for international medical graduates as effective adjuncts to addressing the physician shortage. These elements collectively contribute to a multifaceted strategy that not only tackles immediate shortages but also establishes a robust foundation for a resilient and equitable healthcare system in the future.

In conclusion, this research paper outlines a measured approach to address the physician shortage in the North Midwest region. Utilizing collaboration, strategic expansion, and innovative solutions, the physician shortage can be realistically addressed for the betterment of all.

Acknowledgments: The authors would like to thank the University of Minnesota Medical School - Duluth Campus for their invaluable support during their summer research program.

Funding/Support: None
Other disclosures: None
Ethical approval: Not applicable
Disclaimers: None
Previous presentations: None

The authors report there are no competing interests to declare

References

1. *The complexities of physician supply and demand: projections from 2023 to 2036 - Digital Collections - National Library of Medicine*. (n.d.). https://digirepo.nlm.nih.gov/catalog/nlm:nlmuid-9918417887306676-pdf
2. Chen, X., Orom, H., Hay, J. L., Waters, E. A., Schofield, E., Li, Y., & Kiviniemi, M. T. (2018). Differences in rural and urban health information access and use. Journal of Rural Health, 35(3), 405–417. https://doi.org/10.1111/jrh.12335
3. Loftus, J., Allen, E., Call, K. T., & Everson-Rose, S. A. (2017). Rural-Urban differences in access to preventive health care among publicly insured Minnesotans. Journal of Rural Health, 34, s48–s55. https://doi.org/10.1111/jrh.12235
4. US Census Bureau. (2023, June 13). National Population Totals and Components of Change: 2020-2022. Census.gov. https://www.census.gov/data/datasets/time-series/demo/popest/2020s-national-total.html
5. Health Resources and Service Administration . (n.d.). *Health Workforce Shortage Areas*. Shortage Areas. https://data.hrsa.gov/topics/health-workforce/shortage-areas
6. Rimsza, M. E., Hotaling, A. J., Keown, M. E., Marcin, J. P., Moskowitz, W. B., Sigrest, T. D., & Simon, H. K. (2015). The use of telemedicine to address access and physician workforce shortages. Pediatrics, 136(1), 202–209. https://doi.org/10.1542/peds.2015-1253
7. Chisholm-Burns, M. A., Spivey, C. A., Stallworth, S., & Zivin, J. G. (2019). Analysis of educational debt and income among pharmacists and other health professionals. The American Journal of Pharmaceutical Education, 83(9), 7460. https://doi.org/10.5688/ajpe7460
8. Friedman, A. B., Grischkan, J. A., Dorsey, E. R., & George, B. P. (2016). Forgiven but not Relieved: US Physician Workforce Consequences of Changes to Public Service Loan Forgiveness. Journal of General Internal Medicine, 31(10), 1237–1241. https://doi.org/10.1007/s11606-016-3767-2
9. Evaluation of Minnesota's Health Professional Loan Forgiveness Program. (2021, January). Minnesota. Retrieved August 1, 2024,.
10. Brooks, R. G., Walsh, M., Mardon, R. E., Lewis, M., & Clawson, A. (2002). The roles of Nature and Nurture in the recruitment and retention of primary care physicians in rural areas. Academic Medicine, 77(8), 790–798. https://doi.org/10.1097/00001888-200208000-00008
11. Rosenblatt, R. A., Andrilla, C. H. A., Curtin, T., & Hart, L. G. (2006). Shortages of medical personnel at community health centers. *JAMA*, *295*(9), 1042. https://doi.org/10.1001/jama.295.9.1042
12. Pathman, D. E., Konrad, T. R., King, T. S., Taylor, D. H., & Koch, G. G. (2004). Outcomes of states' scholarship, loan repayment, and related programs for physicians. Medical Care, 42(6), 560–568. https://doi.org/10.1097/01.mlr.0000128003.81622.ef
13. Andrews, J. S., Ryan, A. L., Elliott, V. S., & Brotherton, S. E. (2023). Easing the entry of qualified international medical graduates to U.S. medical practice. Academic Medicine, Publish Ahead of Print. https://doi.org/10.1097/acm.0000000000005310
14. Reeves, S., Pelone, F., Harrison, R., Goldman, J., & Zwarenstein, M. (2017). Interprofessional collaboration to improve professional practice and healthcare outcomes. The Cochrane Library, 2018(8).

https://doi.org/10.1002/14651858.cd000072.pub3

15. Grobler L, Marais BJ, Mabunda S. Interventions for increasing the proportion of health professionals practicing in rural and other underserved areas. Cochrane Database Syst Rev. 2015;2015(6):CD005314. Published 2015 Jun 30. doi:10.1002/14651858.CD005314.pub3